

## STS-133

# Discovery's final landing



Space shuttle Discovery returned to Earth on March 9, ending the 13-day STS-133 mission, its final flight to space. The oldest craft of the three-shuttle fleet, Discovery becomes the first to be retired. During its 27 years in service, the NASA spacecraft flew 39 missions, logging more than 148 million miles. It proved to be a durable and versatile spacecraft. Discovery returned the nation to space after both of the shuttle accidents. Its crews also performed a range of work in space, from conducting science missions to building the International Space Station to setting the Hubble Space Telescope in orbit to launching the Ulysses spacecraft to explore the sun's polar regions.

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# Stennis Space Center turning 50

NASA announced plans to build a rocket engine test facility in Hancock County, Miss., on Oct. 25, 1961. Five decades later, Stennis Space Center is celebrating its golden anniversary as the nation's largest – and premier – rocket engine test facility. Originally built to test the massive Saturn rocket engines and stages needed to carry humans to the moon, Stennis has grown into a unique federal city, home to more than 30 federal, state, academic and private organizations and several technology-based companies. These companies and agencies share the cost of owning and operating the facility, making it more cost-effective for each entity to accomplish its independent mission. However, rocket engine testing remains the primary mission focus at Stennis. The facility tested every main engine used in more than 130 space shuttle flights. It now is preparing three stands to test next-generation rocket engines that will carry humans beyond low-Earth orbit into deep space. In addition, the facility has embraced the call for NASA to work with private companies to enable commercial space travel. In 1998, Stennis partnered with Pratt & Whitney Rocketdyne to test RS-68 engines used for Delta IV rocket launches. Last year, it partnered with Orbital Sciences Corporation to test Aerojet AJ26 rocket engines that will power commercial cargo flights to the International Space Station.



From the desk of

## Pamela Covington

Manager  
Office of External Affairs  
Stennis Space Center



Stennis Space Center turns 50 on October 25, 2011. That's half a century of powering dreams, 50 years of serving as caretakers of national assets, both intellectual and physical property.

Our great state of Mississippi is among an elite group of states that can boast of having a major role in the nation's space program. Dr. Wernher Von Braun said it best, "I don't know yet what method we will use to get to the moon, but I do know that we have to go through Mississippi to get there!"

I was a senior in college before I became fully aware of the national asset, then called the National Space Technology Laboratory, that was practically in my backyard. I still remember the excitement and sense of pride I felt more than 26 years ago when I began my NASA career as a co-op student.

I continue to have that same sense of pride and excitement every day. I have the privilege of working alongside an amazing team in the Office of External Affairs. We lead the way in sharing the journey and experiences of space exploration with the American public. Keeping the public informed, educated and engaged in a way that helps them understand NASA policies,

programs and the results of activities is the foundation of what we do. We accomplish this by disseminating information through exhibiting, media relations, the speaker's bureau program, community stewardship, social networking, our visitor relations program and a host of other venues. We reach millions every year, connecting the relevance of the space program to economic development and everyday quality of life.

It is rewarding to hear the experiences of our engineers and scientists, some of the best minds in the world, when they get to leave the confines of their office and go out in the public to share their work and tell their NASA story to diverse audiences. The men and women who make up the Stennis family are actively involved in their communities, schools, churches and civic organizations, contributing to the betterment of humankind and sharing NASA along the way.

As the month of March ushers in spring and a time of new growth, rebirth and renewal, we are preparing to celebrate the end of the Shuttle Program and its historical accomplishments. We are also anticipating new growth, rebirth and renewal as we prepare for the next chapter of space exploration and explore new ways to share the adventure with the public.

Here's to 50 more years of powering dreams and excelling beyond expectations.

*Pam*



## Federal consortium group visits Stennis

Members of the Southeast U.S. Federal Laboratory Consortium for Technology Transfer gather at the base of the B-1/B-2 Test Stand during a Feb. 10 visit to Stennis Space Center. The group visited Stennis to tour facilities and receive briefings on work at the rocket engine test site. They also visited the INFINITY at NASA Stennis Space Center site and received a briefing on construction of the new science center. The FLC is a nationwide network of federal laboratories to facilitate technology transfers between federal agencies and commercial companies. More than 250 federal laboratories and centers and their parent departments and agencies are FLC members. The southeast region of the consortium represents more than 40 federal laboratories in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee.

## FULFILLING NASA'S EXPLORATION MISSION

# J-2X engine assembly under way



Pratt & Whitney Rocketdyne employees Carlos Alfaro (l) and Oliver Swanier work on the main combustion element of the J-2X rocket engine at their Stennis Space Center facility. Assembly of the J-2X rocket engine to be tested at the site is under way, with completion and delivery to the A-2 Test Stand set for the first of June. The J-2X is being developed as a next-generation engine that can carry humans into deep space. Stennis Space Center is preparing a trio of stands to test the new engine. The A-1 Test Stand is being modified to provide component testing. The A-2 engine will begin sea-level testing of the engine later this spring and summer. Meanwhile, construction is continuing on the A-3 Test Stand, which will be used for simulated high-altitude testing of the new engine. The A-3 Test Stand is set for activation in 2013.

## Stennis prepares to test key A-3 component

The E-2 Test Stand team at Stennis Space Center is moving ahead in preparations for testing a vital component for a next-generation rocket engine test stand under construction onsite.

Testing on the three-module chemical steam generator (CSG), is designed to verify and validate the unit's fabrication, confirming it will perform as needed. The tests also will provide critical data about operating the unit in an efficient manner.

The new A-3 Test Stand will use nine three-module CSG units to generate superheated steam needed to create a vacuum. The vacuum will allow operators to test next-generation rocket engines at simulated high altitudes up to 100,000 feet. Testing at such simulated altitudes is critical for next-generation engines necessary to carry humans into deep space.

"These chemical steam generators are essential in the vacuum capability of the A-3 stand," said Barry Robinson, project manager for the CSG testing project at the E-2 facility. "Our testing is intended to make sure

they perform as designed."

Considerable CSG work already has been done at the E Test Complex, a versatile, three-stand complex used for a variety of research and test projects. Teams have performed tests on "scale models" to identify potential problems and ways to head them off. They also have tested a single CSG module built onsite to make sure the design was correct for the 27 individual modules the A-3 stand needs.

Once the design was verified, Eden Cryogenics in Ohio was awarded the contract for fabricating the nine units. Several have been delivered to Stennis. Now, a full unit will be tested to verify the design has been followed and will perform as intended.

The E-2 test team has been preparing for the test series for months. It recently completed its activation test readiness review and now is moving forward with a series of flow tests to make sure the stand is ready for full CSG testing. Various flow tests will be conducted in March and April in preparation for a final test readiness review in early May. Testing is ex-

pected to begin soon afterward and be completed by the end of June.

The goal is to identify – and address – all needs prior to installing CSG components at the A-3 Test Stand.

"We already know we can operate a single module to superheat steam and draw a vacuum," Robinson said. "Controlling three, and eventually 27, is another thing. We have to prove they will do what they were designed to do."

In addition to answering that question, the upcoming tests will provide valuable information in such areas as the propellant consumption rate of the unit, the necessary start sequencing and how to operate the unit most efficiently.

"We're going to find out a lot of important things in this process," Robinson explained. "This is a big deal. This design for the A-3 Test Stand (using 9 CSG units to create a vacuum) has never been done at this magnitude. It's the first application of its kind. There's a lot of hard work involved."

# Well done,

Just before 4 p.m. CST on Feb. 24, space shuttle main engines Nos. 2048, 2044 and 2058 roared to life at Launch Pad 39A at Kennedy Space Center in Florida. Within seconds, their harnessed power was lifting space shuttle Discovery into the blue Florida sky on its STS-133 mission to the International Space Station. Fourteen days later, Discovery returned to Earth. As it had on 38 previous occasions, Discovery had performed as asked. However, this 39th mission was anything but just another flight. It was Discovery's final flight to space. It is retired with daunting statistics – but numbers never tell the whole story. This especially is true regarding Discovery, which has recorded so many firsts and has carried so many of the nation's space hopes and dreams – again and again. Discovery never failed to lift those shared expectations to realization. It never failed to succeed. If ever a craft earned its retirement, Discovery did so. If ever the ultimate pronouncement of success could be delivered without hesitation or qualification, it can on this occasion. Well done, Discovery! Mission accomplished.

- Discovery is the oldest craft in the three-shuttle fleet. Construction of Discovery began in 1979. It was transported to Kennedy Space Center in Florida in November 1983 and was launched on its first STS-41D mission on Aug. 30, 1984.
- Discovery flew 39 missions, traveling more than 148 million miles.
- Discovery returned the nation to space on two Return to Flight missions – on the STS-26 mission in 1988 following the loss of shuttle Challenger two years earlier, and on the STS-114 mission in 2005 after the loss of shuttle Columbia two years prior.
- On the STS-33 mission in 1989, astronaut Fred Gregory became the first African-American commander in shuttle history – aboard Discovery.
- Discovery's STS-95 mission in 1998 carried space traveler John Glenn, who became the first American to orbit the Earth on the Mercury mission in 1962. At age 77, Glenn became the oldest person to travel to space.

# Discovery!

In its combined 39 missions, Discovery spent a full year in space – a total of 365 days.

- The STS-60 mission aboard Discovery was commanded by current NASA Administrator Charles Bolden on his final flight to space. It also carried Sergei Krikalev, the first Russian cosmonaut to travel aboard a space shuttle.

- Discovery carried 180-plus different crew members into space.

- In 1990, during Discovery's STS-41 mission, crew members launched the Ulyssess robotic space probe to explore the polar regions of the sun.
- The STS-51A flight by Discovery included a unique mission – the deployment of two communications satellites, as well as the retrieval of two other malfunctioning satellites from orbit.
- Discovery is named for two famous exploring ships of the past. In the early 1600s, Henry Hudson sailed aboard his Discovery vessel in search of a northwest passage from the Atlantic to the Pacific. In the 1770s, John Cook sailed voyages aboard his Discovery ship in the South Pacific, resulting in the first European contact with the Hawaiian Islands.
- In April 1990, on its STS-31 mission, Discovery carried the Hubble Space Telescope aloft and placed it in orbit around the Earth.
- On its STS-63 mission in 1995, Discovery carried astronaut Eileen Collins, the first woman to serve as pilot on a shuttle crew.



# Stennis tests shuttle propulsion system



*Note: John C. Stennis Space Center has played a pivotal role in the success of NASA's and the nation's space program. This month, Lagniappe looks back on an important moment in the rocket engine testing center's history.*

Testing of single space shuttle main engines began at the National Space Technology Laboratories (now Stennis Space Center) in 1975, just after the site was designated an independent NASA center. In April 1978, the site conducted its first three-engine test of the space shuttle propulsion system.

Three space shuttle main engines were configured with a 154-foot-long external tank and a 121-ton steel trusswork structure at the B-2 stand, simulating a shuttle orbiter in weight, bulk and structure, although not in appearance.

Stennis employees had spent three years of hard work preparing the stand for the testing after convincing NASA managers they could handle the job better than an outside contractor. By early 1978, what one history account characterized as the best team of rocket test engineers and technicians ever assembled was in place at NSTL.

The test team passed the Firing Readiness Review in early March and began final preparations. On April 21, 1978, a 1.9-second "hotfire" test was conducted, a puff of smoke signaling the beginning of what many call the rocket engine test facility's finest hour.

By early 1981, NSTL personnel had conducted a full series of main propulsion test article tests. Six had met or exceeded the 520-second duration needed to carry a



A trio of space shuttle main engines are installed on the B-2 Test Stand in 1978 to test the space shuttle's main propulsion test article. Testing of the three-engine propulsion system was a critical step before launching the first shuttle mission in 1981.

shuttle from launch to orbit. The final test on Jan. 17, 1981, was the longest at 629 seconds and the first full duration test using flight-type nozzles on the engine.

Following the test, NASA Associate Administrator John Yardley congratulated the NSTL team on a magnificent job, noting "the people down here really know how to make this thing work."

The space shuttle was ready to fly.

## Alternative fuel car makes pit stop at Stennis



NASA's Stennis Space Center, America's largest rocket engine test complex, and one of the country's leading consumers of liquid hydrogen, was the location Feb. 27 for a fuel stop of three Mercedes B-Class F-CELL vehicles. The B-Class F-CELL is an electric vehicle, which is powered by electricity produced on board the vehicle from hydrogen gas. The only emission by this unique vehicle is pure water vapor. Due to the limited number of existing hydrogen locations, Stennis Space Center provided a logical choice for a refueling location as the vehicle makes its way across the United States as part of a worldwide tour.

Office of Diversity and Equal Opportunity

# March focus highlights women’s history

March is designated as National Women’s History Month. In recognition of that, the Office of Diversity & Equal Opportunity would like to highlight the life of a famous woman who stepped out and achieved several firsts for women.

Margaret Bourke-White was born June 14, 1904, in Bronx, New York. Her father, Joseph White, was of Polish-Jewish background. He was an inventor and engineer. He believed in equality in education and opportunity for all his children. Bourke-White’s mother, Minnie Bourke, was of Irish-English ancestry and a loving and nurturing mother. She was completing her college degree at the time of her death.

Bourke-White attended several universities throughout the United States while pursuing a degree in herpetology (the study of reptiles). The schools included Columbia University in New York, the University of Michigan, Purdue University in Indiana and Western Reserve University in Ohio. She received her degree in 1927 from Cornell University in Ithaca, N.Y.

Bourke-White began studying photography as a hobby while a very young woman. She developed the styles and techniques she needed for various formats on her own. Her father also was somewhat of a camera enthusiast and exposed his young daughter to the wonders of the photographic lens.

In time, Bourke-White became a forerunner in the newly emerging field of photojournalism, and was the first female to be hired as such. She was the premier female industrial photographer, getting her start in Cleveland,

Ohio, at the Otis Steel Company around 1927. She also was the first photographer for Fortune magazine, in 1929. In 1930, she was the first Western photographer allowed into the Soviet Union.

She was hired as the first female photojournalist for Life magazine soon after its creation in 1935, and one of her photographs adorned its first cover on Nov. 23, 1936. She was the first female war correspondent, the first to be allowed to work in combat zones during World War II, and one of the first photographers to enter and document the Nazi death camps.

Bourke-White made history with the publication of her haunting photos of the Depression in the book “You Have Seen Their Faces,” a collaboration with husband-to-be Erskine Caldwell. She wrote six books about her international travels.

Margaret Bourke-White was truly a woman of many firsts.

*National Women’s History Month began as a weeklong observance in 1980 to recognize, honor and celebrate the achievements of American women. In 1987, Congress declared March as National Women’s History Month in perpetuity.*

Hail & Farewell	
<b>NASA welcomes the following:</b>	
Cecil Lizana	Human resources specialist Office of Human Capital



## Stennis sponsors Black History Month program

Victoria Webb (center) discusses African-American history during a Black History Month program for Stennis Space Center employees on Feb. 16. Webb, a 103-year-old native of Pass Christian, was guest speaker for the program, sponsored by the Stennis Diversity Council and the Naval Meteorology and Oceanography Command. She was joined in her presentation by Valli Battle (left), a NAVOCEANO employee at Stennis, and friend Jeanell Barnes. Black History Month was first observed in 1976 and is celebrated each February. The 2011 theme was African-Americans and the Civil War.

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## Teams to compete in Bayou Regional tourney

Students from 38 high school teams in seven states are scheduled to compete when the Bayou Regional FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition returns to the New Orleans area March 17-19 at the Alario Center in Westwego, La.

FIRST is a unique varsity sporting competition designed to teach teamwork and inspire students to pursue educations and careers in science, technology, engineering and mathematics fields. Each year, teams from high schools across the nation are given identical parts kits and six weeks to build robots for performing assigned tasks. Teams then use the robots to compete in regional events and earn a spot in a season-ending national tournament.

This year marks the 20th FIRST Robotics Competition season. The 2011 theme is "Logo Motion." During tournaments, three-team alliances will compete on a 27-by-57-foot playing field, attempting to earn points by hanging as many triangle, circle and square logo pieces as possible on pegged walls. Bonus points will be earned for each team that can hang and assemble logo pieces to form the FIRST logo. Robots also can deploy Mini-Bots to climb strategically-placed vertical poles for a chance to earn additional points.

This year's expected Bayou Regional participants include 23 teams from Louisiana schools and eight teams from Mississippi schools.

Qualifying teams from the Bayou Regional event will join more than 300 other teams from across the country to compete in the FIRST Robotics

National Championship April 27-30 in St. Louis.

Each year, NASA and Stennis Space Center support the FIRST Robotics Competition by providing team coaches, mentors, training, judges, referees, a machine shop and other volunteers.



## Stennis senior staff members host Children's Hospital outreach

NASA senior staff members from Stennis Space Center traveled to Children's Hospital in New Orleans on Feb. 4 for a morning of educational outreach, offering interactive demonstrations and activities for children. Staff members offered cryogenic demonstrations, informative and interactive exhibits and a chance for children to take photos "wearing" a space suit. Children also had a chance to interact with Stennis' astronaut mascot. At the end of the activities, Stennis staff members presented the hospital with a framed collage, which reads, "Your leadership, inspiration and healing hands help ensure future generations of explorers can reach for the stars and beyond." The framed presentation included small American and state of Louisiana flags flown into space aboard shuttle Atlantis' STS-132 mission last spring. Hospital Vice President for Marketing Brian Landry (center) received the collage on behalf of the hospital.